

Environmental Regulation of New Mexico's Dairy Industry

Dale M. Doremus, *Ground Water Quality Bureau, New Mexico Environment Department*

Dairy farming in New Mexico has a long history dating back to Spanish colonization. According to the New Mexico Department of Agriculture, herd sizes statewide were as large as 40,000 in 1912, growing to 83,000 by the 1940s. During the middle part of the century herd sizes fluctuated as the dairy industry made the nationwide transition from small independent dairy farms to larger operations, marketing through nationwide cooperatives. The late 1990s were a period of rapid growth for New Mexico's dairy industry. The New Mexico State University Cooperative Extension Service reports that the industry grew from 105 producers and 80,000 cows statewide in 1990 to 175 producers and 310,000 cows in 2003. The industry had a 375 percent



increase in overall milk production statewide during the same period. New Mexico now ranks seventh in the nation in milk production, eighth in the nation for cheese production, and has the largest number of cows per herd in the nation. New Mexico State University estimated the economic impact of New Mexico's dairy industry as approximately 1.5 billion dollars in the year 2000.

The large influx of dairies relocating to New Mexico from California, Texas, and Arizona in the early 1990s is attributed to a combination of several factors, including an ideal climate for herd health, availability of ready-made feed supplies, improved methods of transporting milk, and affordable farm land. The

largest milk-producing counties in New Mexico are Chaves, Doña Ana, Roosevelt, Curry, Lea, and Eddy.

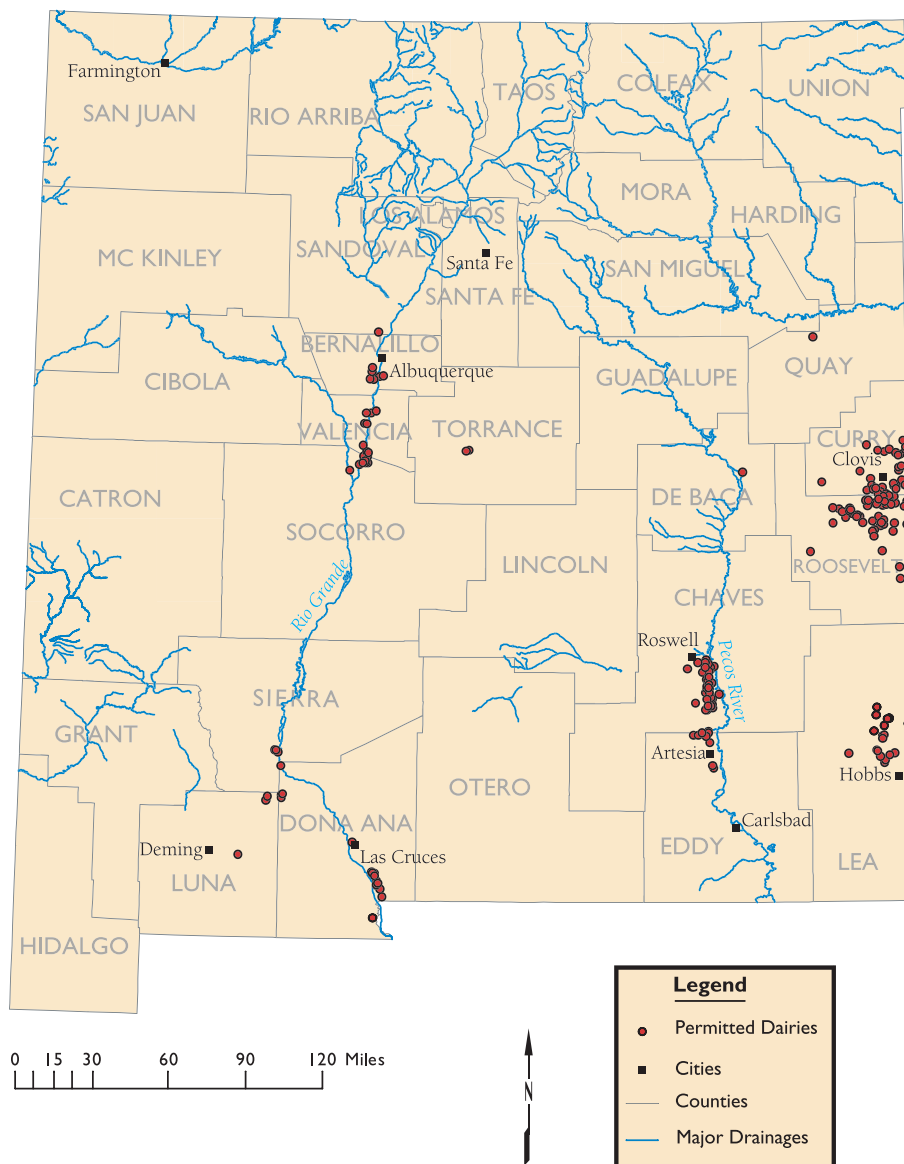
A routine part of business start-up operations for a dairy facility is obtaining required permits. Dairies are regulated by multiple state and federal agencies including the U.S. Food and Drug Administration, U.S. Department of Agriculture (USDA), U.S. Environmental Protection Agency (EPA), New Mexico Department of Agriculture (NMDA), New Mexico Office of the State Engineer (OSE) and the New Mexico Environment Department (NMED).

This paper will serve as an introduction to environmental regulation of the dairy industry in New Mexico, with a focus on water-quality regulation under the jurisdiction of the New Mexico Environment Department.

LAWS AND REGULATIONS GOVERNING WATER QUALITY AT DAIRY FACILITIES

Both state and federal agencies play a significant role in water-quality protection in New Mexico. New Mexico's ground water protection program was well established before most federal legislation and regulations addressing ground water quality were adopted. In 1967 the state's first water-quality protection law, the Water Quality Act, was adopted by the New Mexico legislature. This law was amended in 1973 to allow the State of New Mexico to adopt regulations requiring permits for water-quality protection.

By 1977 the State of New Mexico had adopted a comprehensive ground water-quality program applicable to most types of discharges through regulations promulgated by the New Mexico Water Quality Control Commission (WQCC). The WQCC regulations are the basic framework for New Mexico's water-quality management and protection programs. Key features of the WQCC regulations include numerical ground water quality standards, ground water discharge permit and pollution prevention requirements, and abatement requirements. The regulations and standards are designed to protect all ground water in New Mexico with a total dissolved solids concentration of 10,000 milligrams per liter (mg/l) or less.



Permitted dairies in New Mexico.

The foundation of the state's ground water pollution prevention program is the ground water discharge permit regulations. These regulations require that a person discharging onto or below the surface of the ground demonstrate that the discharge will not cause ground water standards to be exceeded at any place of withdrawal for present or foreseeable future use, and will not cause any stream standard to be violated. NMED's Ground Water Quality Bureau (GWQB) is responsible for administration of the WQCC ground water regulations as they apply to mining, industrial, domestic, and agricultural discharges. Ground water discharge permits include industry-

specific and site-specific requirements.

The State also coordinates with the EPA in implementing the federal Clean Water Act, Safe Drinking Water Act, and other federal laws that contain water-quality protection provisions. The EPA administers permits that are applicable to Concentrated Animal Feeding Operations (CAFOs) pursuant to the federal Clean Water Act. These permits are federal permits intended primarily to protect surface water quality. The NMED Surface Water Quality Bureau (SWQB) coordinates with EPA in administering the CAFO program by certifying permits, conducting inspections, and providing program information to the public and permittees.

SOURCES OF GROUND WATER CONTAMINATION AT DAIRIES

New Mexico's dairies are concentrated in four areas. Three of these areas are located over alluvial aquifers along the middle Rio Grande, lower Rio Grande, and the Pecos River near Roswell. The fourth area is clustered in the east-central and southeastern side of the state on

the Llano Estacado, which overlies the Ogallala aquifer. Shallow ground water and highly permeable coarse-grained sediments in alluvial environments along the Pecos River and Rio Grande are highly vulnerable to migration of contaminants to ground water. The permeable sediments overlying the Ogallala aquifer and its equivalent are also vulnerable to contaminant migration, although ground water occurs at greater depths in this area.

The primary ground water contaminant at dairies is nitrate, which is present in the form of organic nitrogen in dairy wastewater. Wastewater that moves downward through the vadose (unsaturated) zone usually encounters conditions that allow the conversion of organic nitrogen to nitrate, a common contaminant in

ground water. Total nitrogen concentrations in dairy wastewater typically range from 200 to 500 mg/l as compared with domestic wastewater, which averages 60 mg/l. Nitrate is the contaminant of primary concern at dairies because the ground water standard of 10 mg/l for nitrate is based on human health impacts. Chloride and total dissolved solids present in the wastewater may also threaten ground water quality. NMED has identified ground water contamination at approximately 30 percent of permitted dairies, contamination that is primarily associated with past waste disposal practices. At several of these sites, nitrate concentrations in ground water have exceeded 150 mg/l.

Wastewater at dairies is typically disposed of by evaporation in lagoons and/or by land application to crops. Potential wastewater discharge sites at a dairy may include: the collection sump, wastewater delivery pipelines, irrigation ditches, storage lagoons, stormwater lagoons, manure solids storage, and land application areas. Unlined or improperly lined storage lagoons present the greatest risk of subsurface wastewater migration due to the constant hydraulic head that is produced from standing water in the lagoon.

Areas in which wastewater is applied to a crop can also be a significant source of ground water contamination when wastewater containing high concentrations of nitrogen is applied unevenly or at a rate that exceeds the nitrogen utilization capacity of the crops being grown. Facilities may apply chemical fertilizer and manure solids in addition to wastewater and therefore exceed the nitrogen uptake capacity of the crop. The vulnerability of certain soils to rapid infiltration is an important consideration in the design of land application programs.

As the dairy industry has grown in New Mexico, so has the understanding of management practices best suited for ground water protection at dairy operations. Initially, permits for dairies focused primarily on wastewater lagoons, the need for liners, and ground water monitoring. As the understanding of contaminant sources has progressed and data from ground water monitoring has become available, a more integrated approach to ground water protection based on site-specific dairy operations has been developed. For example, permits now require crop and nutrient management plans and include soil sampling to provide

Protection of New Mexico's Ground Water Resources

Programs to prevent ground water pollution have proven to be much more effective than cleanup programs in sustaining usable ground water supplies. Prevention of ground water pollution is much more cost effective than trying to clean up an aquifer after it has become contaminated. Cleanup is always expensive, often costing hundreds of thousands or even millions of dollars, and taking many years. In fact, cleanup is sometimes impossible at any price. Therefore, it is much less expensive in the long run to be sure that adequate resources are devoted to prevention of ground water pollution.

The ground water pollution prevention provisions of the WQCC regulations are designed to ensure the long-term protection of New

Mexico's ground water resources. These ground water resources are essential to sustaining the state's populace, business, and agriculture. Approximately 90 percent of the total population of the state depends on ground water for drinking water. Nearly 80 percent of the population is served by public systems with water derived from ground water sources. Approximately 10 percent of the state population depends on private wells for drinking water. Nearly half of the total water annually withdrawn for all uses in New Mexico, including agriculture and industry, is ground water, the only practical source of water in many areas of the state.

In recent drought years, the state has depended even more heavily on ground water to sustain the

state's residential population and business community. New Mexico encompasses some of the fastest growing areas in the United States. According to the U.S. Census Bureau, the population of New Mexico increased by more than 20 percent from 1990 to 2000. In November 1998, U.S. News and Water Online reported that population growth in parts of New Mexico is expected to outpace the water supply by 2025, despite conservation and reclamation projects. If these growth trends hold true for the future, New Mexico's need for clean water supplies will increase each decade. The scarcity of fresh water is and will continue to be one of the biggest issues facing New Mexico.

for early detection of potential ground water contamination. All dairies with lagoon systems now are required to have properly constructed liners with engineering oversight. Site-specific conditions dictate whether the liner is clay or synthetic. Written policies and guidelines have improved consistency in the requirements imposed on different facilities, and in communicating to the regulated community minimum standards for permit approval. The program has also been working with older permitted facilities to bring them into compliance with current standards, policies, and guidelines. As a result of these types of improvements, ground water permits are more protective of ground water quality today than in the past.

COOPERATIVE APPROACH TO WATER-QUALITY PROTECTION

During the past several years the Ground Water Quality Bureau has established a proactive and cooperative working relationship with dairy producers as well as other agencies that regulate and assist dairies. The New Mexico Environment Department understands that input from dairy producers provides important insight into dairy operations that is essential for developing practical management practices that are protective of ground water quality.

In light of the potential contamination sources associated with dairy operations, NMED and the dairy producers worked together in 1996 to develop a policy that set forth best management practices for storage and disposal of dairy wastes. The policy was designed to provide flexibility as well as consistency in the application of the regulations to the dairy facilities. The GWQB has also developed guidelines for liner material and construction of clay and synthetic lined lagoons as well as other guidelines that are applicable to dairy facilities. In 1997 the GWQB established a technical working group to provide a forum for open exchange of technical information related to ground water quality protection issues involving dairy operations. The dairy technical working group includes representatives from agriculture and dairy organizations, academia, state, federal and local agencies, and individual dairy farmers.

The federal CAFO regulations and permit requirements have significant overlap with ground water discharge permit requirements. Dairy operators are concerned about duplication of state and federal requirements. NMED has undertaken a collaborative effort to develop a unified regulatory approach for dairies that would satisfy requirements of both the

federal Clean Water Act and the state Water Quality Act, within the limitations of each statute and respective regulations. Toward this goal the GWQB and SWQB are working with EPA and the Natural Resources Conservation Service to increase permit consistency and to reduce regulatory duplication and confusion.

Collaboration on water-quality protection between agencies and the regulated community has resulted in a better understanding of issues and a more comprehensive approach to regulation of dairies, which improves NMED's ability to protect water quality.

SUGGESTED READING

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